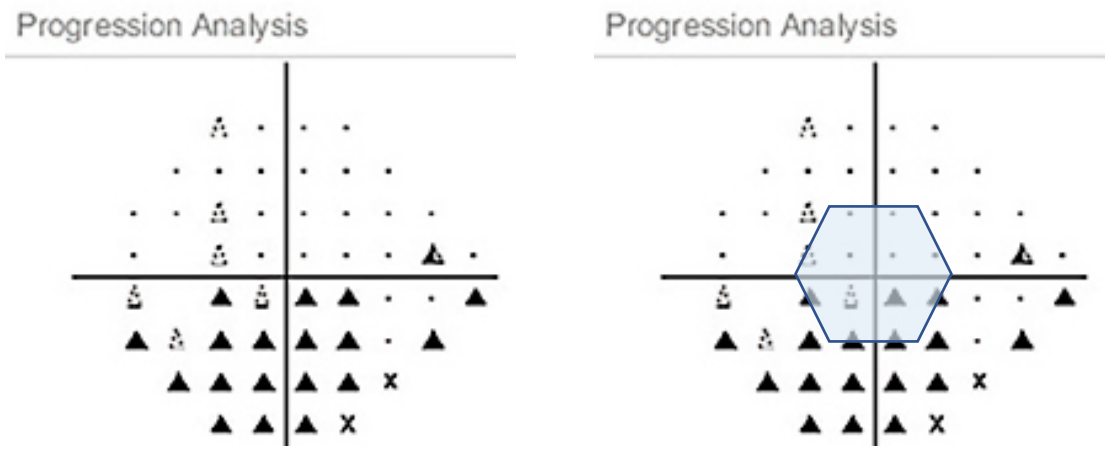
Detecting progression in the center of the visual field



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Disclosures

Carl Zeiss Meditec, Inc. (CZMI), Dublin, CA, USA

- Mary Durbin, PhD: CZMI (E)
- Gary Lee, PhD: CZMI (E)
- Thomas Callan, OD: CZMI (E)
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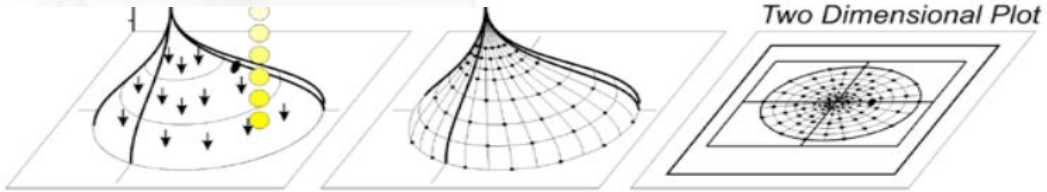
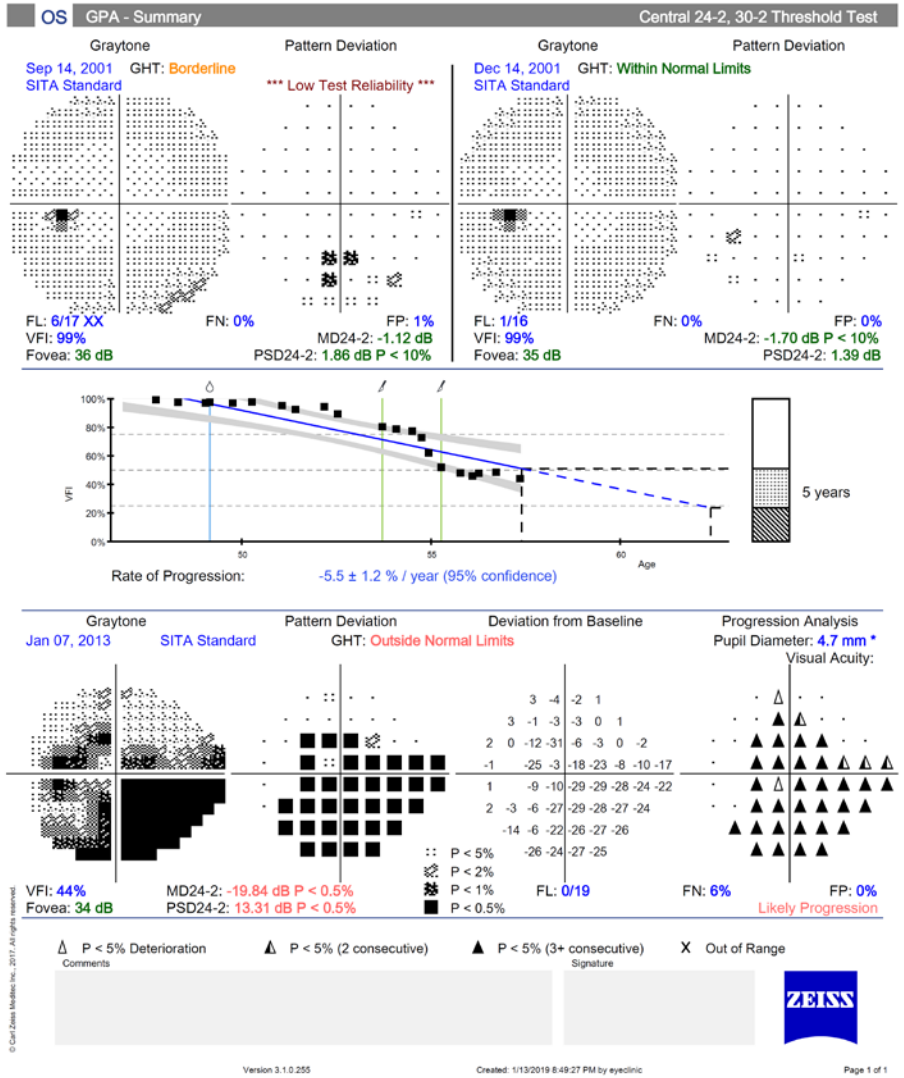
- Ian P Conner, MD, PhD: CZMI (F); Ocugenix (S)

Background – HFA

Threshold Standard Automated Perimetry (SAP)

FORUM





Slightly modified translation of:
U. Schiefer, J. Pätzold, F. Dannheim: Konventionalle Perimetrie. Teil I: Einführung – Grundbegriffe. Der

Background – HFA

Threshold Standard Automated Perimetry (SAP)

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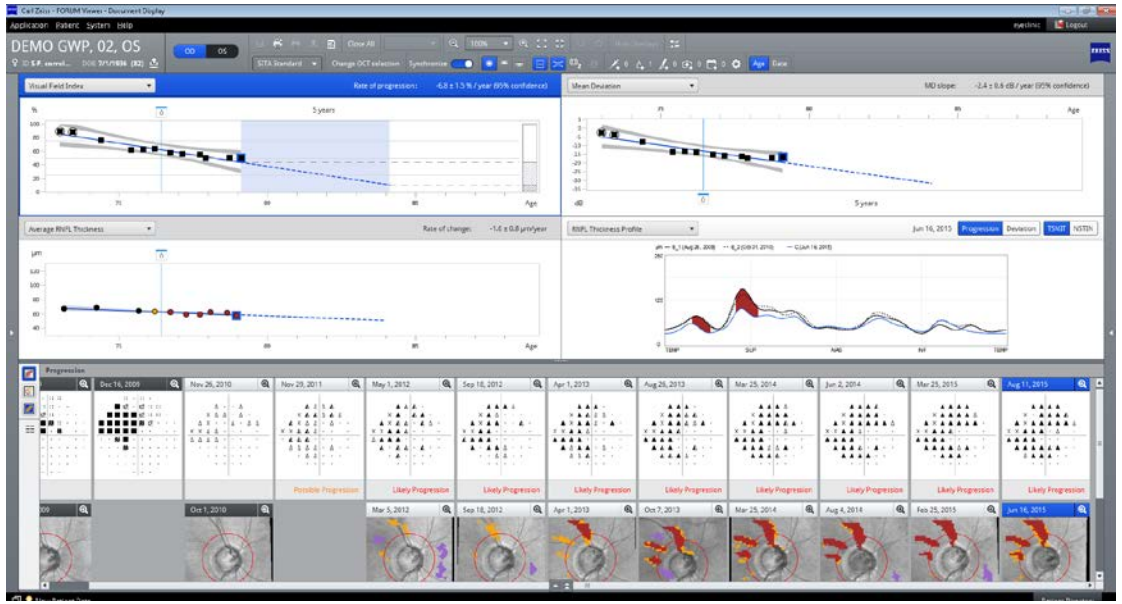
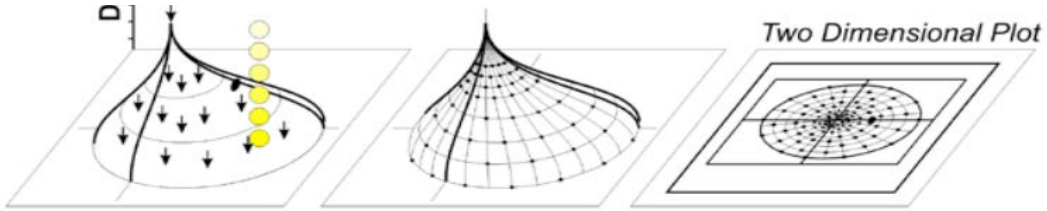
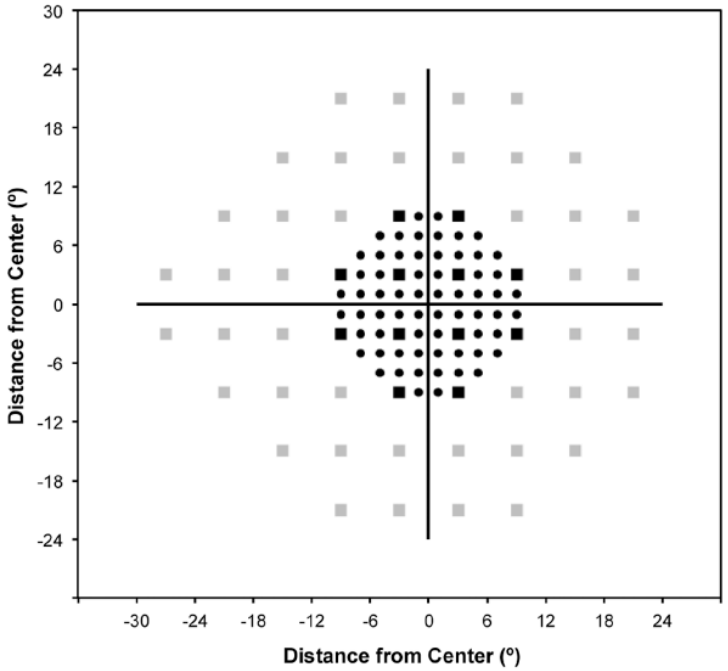




*Differential Light Sensitivity

Purpose

- 24-2 visual field test has limited ability to detect change in the center of the visual field (VF).
- One approach to detecting change is to apply the change limits estimated from the central points in repeated 24-2 scans to 10-2 scans.
- In this study we use short-term reproducibility data to determine the specificity of using the 24-2 inner zone change limits from the HFA guided progression analysis (GPA) to detect change in the 10-2 VF.

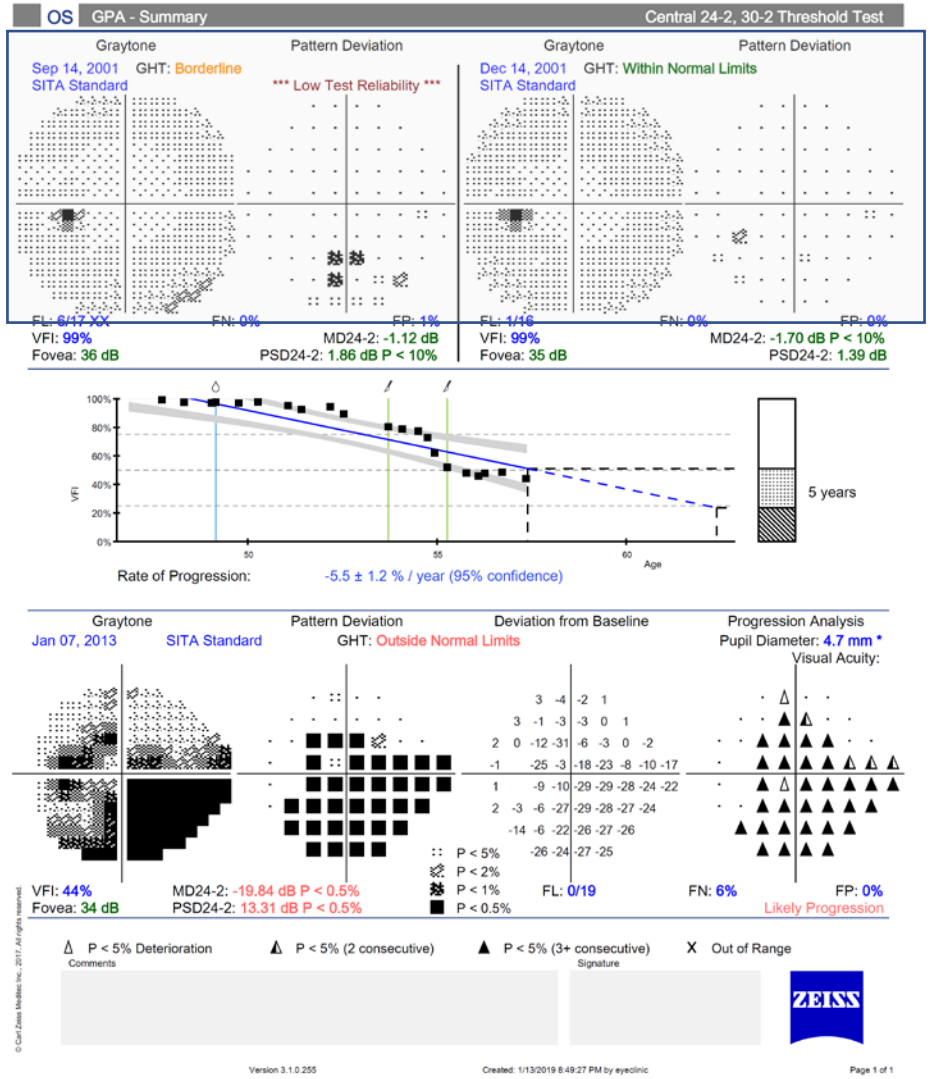


Methods – Data for Test

- Three sites
- 74 eyes of 74 glaucoma subjects were enrolled
- HFA™ II-i (ZEISS, Dublin, CA)
- SITA Standard 10-2 and 24-2 VFs
- 5 repeat visits within 3 months
- Because the repeated visits occurred over a short period of time, we deemed any change observed in this data to be a false positive.

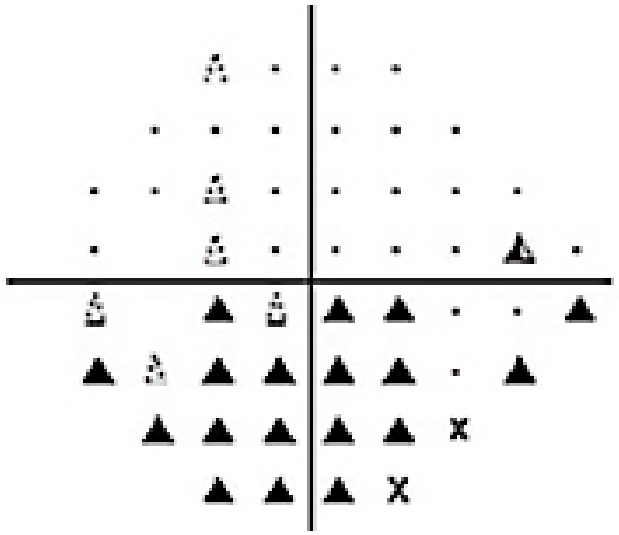
Methods – GPA

- In HFA, GPA change limits in the 24-2 field depend on:
  - baseline mean deviation (MD),
  - baseline pattern deviation (PD)
  - and location
- Two scans averaged to create baseline
- Follow ups compared to baseline
- Differences are compared to change limits by zones
- GPA is not performed where the MD or PD are too poor (censoring), denoted as "X"



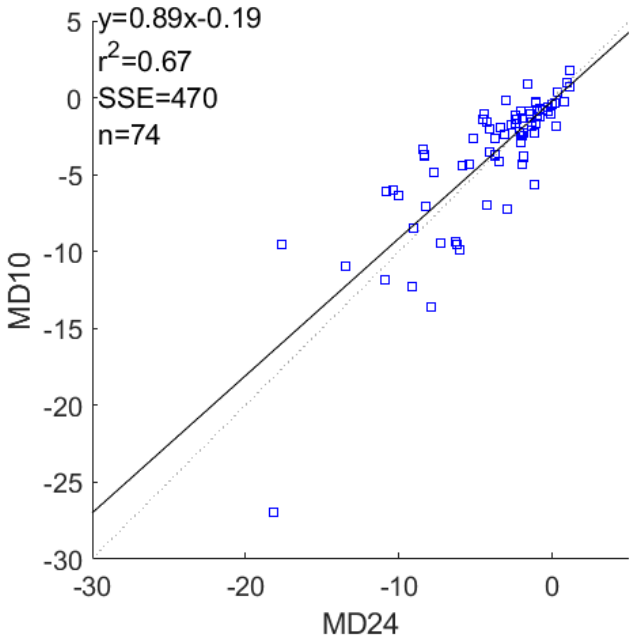
Methods – Calculating False Positive Rate

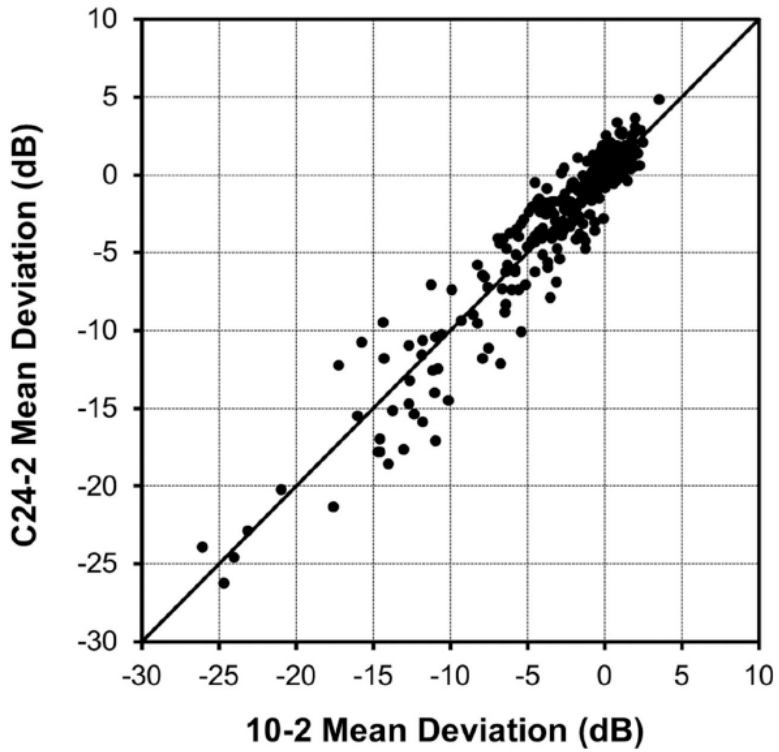
- False positive rates (FPR) with 95% confidence intervals (CI) were pooled for all 74 patients and all 68 test points in the 10-2 for both follow-ups.
- Specificity defined as 1 – FPR.
- FPR calculated two ways:
  - pooling all points,
  - pooling only uncensored points (those not marked “X”).



Methods / Results:
MD from 10-2 can be used in place of 24-2

- Correlation of 24-2 MD with 10-2 MD showed an R^2 of 0.67, a slope of 0.89 and an offset of 0.19, so it is reasonable to substitute the MD from 10-2 to determine change limits. (Consistent with Wu et al, *Ophthalmology Glaucoma* 2019)





Ophthalmol Glaucoma. 2019 ; 2(2): 95–102. doi:10.1016/j.ogla.2019.01.003.

Methods – change limits for 10-2 derived from 24-2 central zone

- Change limits as implemented in HFA Guided Progression Analysis
  - Limits = *f*(eccentricity, field status (MD), local defect depth (PD))

central zone

from 10-2 field

from 10-2 location

- Derived from 300+ eyes with 4 visits across multiple test strategies (but not 10-2)

Results – Specificity

Population Descriptive Statistics:

- Mean age was 63.6 (35.7 to 79.6) years
- Mean MD was -3.9 (-18.2 to 1.2) dB

False Positive Rate(s) / Specificity

- FPR was 0.047 (CI: 0.043 to 0.052) considering all 10064 pooled points
- FPR was 0.051 (CI: 0.046 to 0.055) considering 9380 pooled valid points
- Both FPRs consistent with specificity of ~95%. Similar performance for 24-2.
- Confirmation improves specificity to ~99%

Conclusions

- Specificity was ~95% for detecting progression in 10-2 fields using limits established in the central portion of the 24-2
- Simple GPA for 10-2 can be created using existing data
- Once limits have been established, sensitivity will depend on rate of change as compared to those limits

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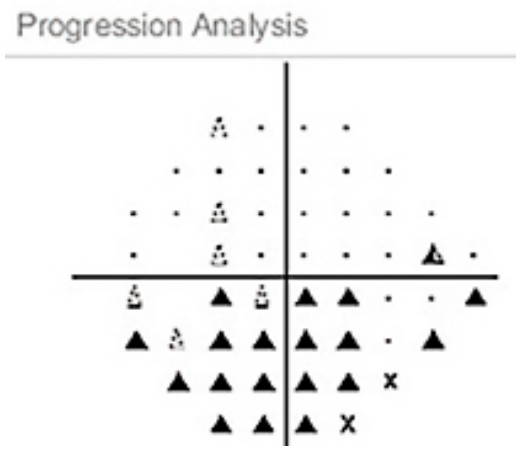

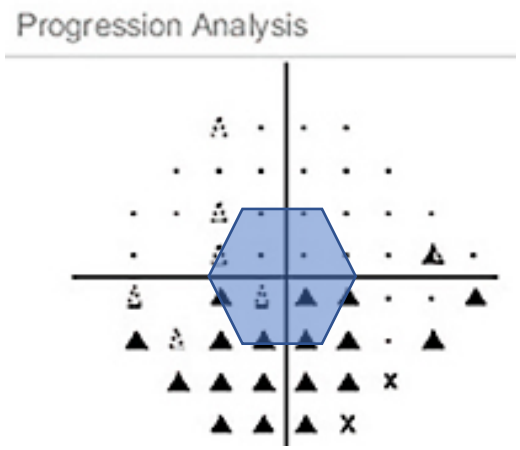

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